
Pressure Tester Struck by Bull Plug in Wyoming

SUMMARY

A 30 year old male oilfield pressure tester died at the scene of an oil rig where he was conducting a pressure test when a bull-plug dislodged from a flow-back manifold, striking the victim in the head. The victim was testing well pressure, and was in the process of releasing pressure from the pressure manifold into the burn pit when the cap came loose under 10,000 psi pressure. The victim was knocked to the ground, his hard hat was thrown 30 yards away from the victim, and the pressure plug shot 200 yards beyond where the victim lay. The nearest witness to the incident was approximately 10' to 15' away, and facing in the opposite direction when he heard a pop, followed by the sound of pressure blowing off. He turned and saw the victim on the ground with severe damage to his head. The witness used a cellular phone to call for help. The victim apparently died within seconds of the incident.

Employers may be able to minimize the potential for occurrence of this type of incident through the following precautions:

- **Establish periodic training/recertification procedures that emphasize those unique risks that come from pressure-related velocity-caused injury.**
- **Encourage employees at locations which are distant from hospital/ambulance services to participate in EMT/Rescue training programs.**
- **Consider temporary deflection barriers for instances where safety professionals are particularly at-risk through close proximity to pressure-related devices.**
- **Alert manufacturing employees to the criticality of meeting standards specifications toward prevention of injury to on-site safety professionals.**

INTRODUCTION

At approximately 2:30 p.m. on Friday, March 20, 1992, a testing service company pressure tester was testing at a rig site in a remote desert location when a bull-plug from a newly acquired manifold pressure unit came loose, striking the victim in the head with a velocity from 10,000 psi of water pressure. The victim was working with a representative of a private consulting firm to conduct testing at the site, and had apparently brought the pressure up to a level of 10,000 psi. He was attempting to release the pressure into a burn pit when the cap dislodged, shooting the plug into the right side of the victim's head.

At the time of the incident, the victim was working with a private consultant under contract with owners of the oil rig where the circumstance occurred. The victim had apparently completed pressure testing the down hole and had moved to the pressure manifold to release the pressure into the burnpit, via pressure relief control valves. The consultant had turned to look away toward the workover rig when he heard the pop and pressure blow off. Turning back, he saw the victim lying on the ground. Seeing the damage that had occurred, he used his cellular phone to call for assistance.

INVESTIGATION

An article in the March 21, 1992 edition of a local newspaper noted that an oilfield worker had been killed when a compressor exploded at a remote rig site. Through a reciprocal notification agreement with the OSHA Administrator of the Wyoming Department of Employment, the WY-FACE Project was notified of the incident at 11:10 a.m. on March 23, 1992. As a result of those notifications, communications were initiated with the county coroner, the county sheriff and representatives of the company where the victim was employed. Conversations were held with investigators and pertinent reports were requested.

The incident occurred on an oil rig workover site at a remote desert location approximately 35 miles from the nearest town. Skies were overcast at the time of the incident and the temperature was approximately 59 degrees Fahrenheit. The job was approaching the culmination of highest risk, as the pressure buildup had been completed. The pressure graph showed buildup to 10,000 psi followed by a sudden drop to 0. The victim was wearing a hard hat which was knocked off by the force of impact. The victim was considered by the company and his co-workers to be very competent and well trained. He did not appear to be physically or emotionally at risk.

The piece of equipment that was being tested was a newly acquired pressure manifold that had been pre-assembled and tested to 10,000 psi, and brought to the site three days prior to the incident. There was no indication that the equipment had been touched or tampered with since it had been brought to the site.

The device was designed to release well pressure, and was being tested by safety professionals to ascertain that it would function properly as needed during ongoing oilfield operations. Such tests are conducted as a standard procedure when changes are made that could effect pressure retention throughout the system.

Investigation by law enforcement officers determined from thread stripping and remnants of teflon tape wrapping, that the plug had been held in place by four threads. The unit would properly be tightened beyond that threading distance. The victim had been working at the site for approximately 45 minutes before the incident occurred.

The initial call for assistance was received by an off-duty deputy sheriff, who contacted an in-county ambulance service, and both proceeded to the incident site. En route, they were notified that an additional call had been received by the nearest hospital in an adjacent county, and also that an ambulance from another town in that county was en route. Access to the site required crossing and recrossing both state and county lines. Near the incident site, the enforcement officer observed a third ambulance service vehicle en route, and learned that a deputy county coroner was on board. Both the enforcement officer and the deputy coroner had travelled approximately 120 miles on a combination of Interstate, Primary, Secondary, County, and Company roads to the incident site, and arrived approximately 2 hours and 25 minutes after receiving notification.

The movement was so sudden, and the force so powerful, that no responsive action by the victim would have been possible.

No on-site response actions were taken, other than to call off-site emergency personnel for assistance. It was apparent that the victim had died instantly from his injuries, and no life-saving response was

necessary. The incident site was apparently left untouched until off-site professionals could complete their investigations. No continued threat existed as a result of the incident.

The company has been in business for five years as a testing and service company. The business employs 19 people, with seven of those employees working in the area of sales and testing. The victim had worked for the company since September of 1987, and had been a salesman/pressure tester since he finished his training with the company. He had been conducting the general task that took his life for the past three years. The pressure manifold with the cap attached, had been brought to the sight 3 days prior to the incident, and had been pre-tested to a pressure of 10,000 psi. Investigators at the scene determined by the number of threads that had been stripped off and the remnants of teflon tape around the threading area, that the plug that struck the victim had been held by four threads prior to shooting off the manifold.

CAUSE OF DEATH

The Medical Examiner listed the cause of death as Evisceration of Brain due to high pressure water jet/ Massive Head Trauma.

RECOMMENDATIONS/DISCUSSION

Care should be taken to emphasize the speed and velocity with which pressure-caused explosions cause damage, and the inability to react in time to avoid injury. As training and recertification of law enforcement personnel emphasizes the dangers inherent to police officers facing firearms, and firefighters are reminded in ongoing training of the hazards of entering a building where lack of oxygen and falling materials minimize reactive capabilities, professionals in private enterprise should review those specific hazards to their profession.

Employees at remote sites, such as oil rig locations, should be encouraged to participate in life-support activities, such as EMT or emergency response training programs. In those pressure-related instances where less-than-fatal injury occurs, such actions can minimize the potential for increased loss during the time required for transportation to medical facilities.

Concern should be given to need for additional protective aids at those times when high-risk jobs require an employee to be in close proximity to a pressure-related device that might be subject to explosion. While care should be taken to not require wearing apparel that would inhibit necessary reaction to less severe discharge, it may be worth considering portable deflective barriers under certain conditions.

Employees of manufacturing plants where equipment is made that will be used under conditions similar to this incident, should be reminded of the on-site consequences that occur if safety standards are not met in production, assembly, and testing of equipment. The worker safety programs conducted in manufacturing plants could be enhanced by including emergency service or user organization safety personnel as periodic speakers.

FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY (FACE) PROJECT

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study include: Georgia, Indiana, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

NIOSH Funded/State-based FACE Projects providing surveillance and intervention capabilities to show a measurable reduction in workplace fatalities include: Alaska, California, Colorado, Massachusetts, New Jersey, Minnesota, Missouri, Wisconsin, and Wyoming.

Additional information regarding this report is available from:

Wyoming Occupational Fatality Analysis Program
522 Hathaway Building - 2300 Capitol Avenue
Cheyenne, WY 82002
(307) 777-5439

Please use information listed on the Contact Sheet on the NIOSH FACE web site to contact [In-house FACE program personnel](#) regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.